

## ABSTRACT

An improved laser scanning apparatus (46) for determining frame or unibody alignment or misalignment of a vehicle (40) is provided, which includes a laser assembly (54), a pair of rotatable mirror assemblies (56,58) and laser detectors (114,116) located within an enclosed housing (50,52). The laser assembly (54) has an upper pair of lasers (122,126) located in known, spaced relationship above a lower pair of lasers (124,128); detector assemblies (114, 116) are also provided including substantially parabolic reflective surfaces (118a, 120a) with detectors (114a, 116a) disposed substantially at the focal point of the surfaces (118a, 120a). The apparatus (46) is used in conjunction with a plurality of individually coded reflective targets (44) which are suspended from known reference points on the vehicle (40). In use, the laser assembly (54) in conjunction with the mirror assemblies (56,58) directs upper and lower laser beams through 360 degree scans to impinge on the targets (44); laser radiation reflected from the targets (44) is detected by the detector assemblies (114, 116), allowing trigonometric calculation of target positions using information derived from the scans of the upper and lower beams. In this way, a determination can be made if any of the targets (44) are out of plumb (i.e., not truly vertical). Preferably, the housing (50,52) includes a pair of elongated, laser-transparent panels (88, 90) and is effectively sealed to minimize contamination of the apparatus (46). The provision of parabolic detection assemblies 114, 116 increases the signal-to-noise ratio for the apparatus (46).

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